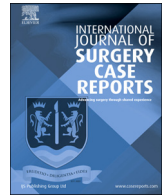




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Right atrial thrombus and massive pulmonary embolism refractory to thrombolytic therapy: A case report

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ABSTRACT

INTRODUCTION: Unsuccessful thrombolysis in the setting of massive pulmonary embolism confers poor prognosis and the optimal management strategy is unknown. Options include re-thrombolysis and embolectomy.

PRESENTATION OF CASE: A 32-year-old lady presented with massive pulmonary embolism accompanied by an intermittently-obstructive right atrial thrombus. Failure to improve with thrombolytic therapy prompted transfer to our cardiothoracic unit for emergency surgical embolectomy. The procedure and postoperative course were without complications and the patient made a complete recovery.

DISCUSSION: Contemporary data has favoured thrombolytic therapies over surgical embolectomy as the initial management strategy in massive pulmonary embolism. This case is a timely reminder of the role that surgery retains in the management of these critically ill patients, particularly when cases are complicated. We illustrate the importance of rescue surgical embolectomy in the management of massive pulmonary embolism following unsuccessful thrombolysis. In addition, we briefly review other scenarios in the management of massive pulmonary embolism where lower threshold for surgical intervention is warranted.

CONCLUSION: Although current data are insufficient to direct a high level of evidence-based care, this case report and others highlight the feasibility and safety of surgical embolectomy in complicated cases of massive pulmonary embolism.

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1. Introduction

Pulmonary embolism continues to have a high mortality rate despite advances in diagnosis and therapy [1]. Improving outcomes in patients with haemodynamic compromise requires intervention beyond anticoagulation and supportive care, either with thrombolytic therapy or surgical embolectomy. Multidisciplinary teams with active involvement of cardiac surgeons have reintroduced the concept of surgical embolectomy in massive pulmonary embolism as an alternative to thrombolysis, with a possible reduction in major haemorrhage [2]. In selected cases of pulmonary embolism, surgery is imperative and potentially life-saving, but delineating these circumstances remains an area of uncertainty [3]. We report a complex case of pulmonary embolism in a young postpartum woman who failed to improve with thrombolytic therapy. She underwent successful surgical embolectomy following transfer to our centre in a critical condition.

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2. Presentation of case

A 32-year-old woman presented to a secondary hospital with sudden onset of breathlessness and chest pain. Three weeks previously she had a spontaneous vaginal delivery following an uncomplicated term pregnancy. On initial assessment she was hypotensive, tachycardic and hypoxic with clinical features of acute right heart dysfunction. Electrocardiography showed sinus tachycardia and right axis deviation with negative T-waves in leads III and aVF. Cardiac troponins and N-terminal pro-BNP levels were elevated. A presumptive diagnosis of pulmonary embolism was made, and a loading dose of unfractionated heparin was given intravenously.

Inotropic supports were commenced in the intensive care setting followed by prompt bedside transoesophageal (TOE) echocardiography. There was evidence of right heart failure with systolic pressures estimated at 85 mmHg using continuous flow Doppler. A highly mobile right atrial mass was visualised prolapsing across the tricuspid orifice during diastole, with associated moderate tricuspid regurgitation (Fig. 1). Limited TOE views of the right main pulmonary artery were suggestive of pulmonary embolism

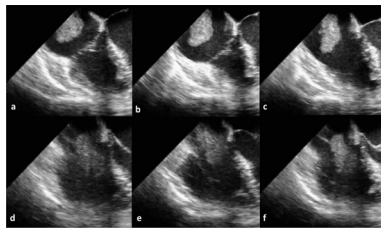


Fig. 1. Series of transesophageal echocardiographic images demonstrating a highly mobile, homogeneously echogenic right atrial mass.

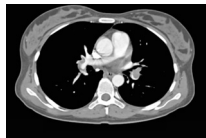


Fig. 2. Computed tomography pulmonary angiogram showing extensive bilateral filling defects in the right and left main pulmonary arteries.



Fig. 3. Specimen excised from the right atrium at surgery. Substantial clot was also extracted from the pulmonary arteries under direct vision.

and extensive bilateral emboli were later confirmed on computed tomography pulmonary angiography (Fig. 2).

The patient was thrombolysed approximately one hour and twenty minutes after presentation. A standard alteplase regimen was administered over two hours, with unfractionated heparin continued thereafter. Eight hours post-thrombolysis, the patient remained haemodynamically compromised. With increasing inotropic requirements, we facilitated transfer to our centre for consideration of emergency surgical embolectomy. She was critically ill on arrival.

Median sternotomy and pericardiotomy were performed and the patient was commenced on hypothermic cardiopulmonary bypass with standard aortobicaval cannulation. Following transverse arteriotomy, clots were removed en bloc from the right and left main pulmonary arteries, with three smaller clots extracted from segmental arteries under direct vision. On opening the right atrium, an organised 55 mm × 25 mm thrombus with a short pedicle was seen adherent along the lower margin of the crista terminalis (Fig. 3). In addition, a large volume of loose clot was present in the inferior vena cava. The mass was excised and loose clot suctioned before standard closure.

Initially, direct transition to peripheral extracorporeal life support was considered but with prelead optimisation and vasopressor support we met haemodynamic targets for separation from cardiopulmonary bypass. The postoperative course was uneventful. Histological examination of the atrial mass revealed laminated fragments of dead blood cells and fibrin consistent with organised thrombus (Fig. 4). The patient was commenced on a novel oral anticoagulant before discharge and was followed in our pulmonary hypertension clinic. Six months later she was without recurrence of thromboembolic disease and right heart pressures were within normal limits.

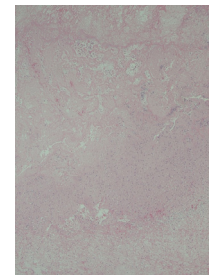


Fig. 4. Organised thrombus composed of platelets and fibrin with entrapped red blood cells.

3. Discussion

The optimal management strategy for massive pulmonary embolism remains poorly defined. Based on evidence from retrospective analyses, current guidelines recommend the use of systemic thrombolysis as first-line therapy in patients with shock or hypotension [1,4,5]. Although similar data is published to support surgical embolectomy, this approach has fallen out of preference [4,5]. Embolectomy is less available and carries a number of operative risks but affords a lower incidence of major haemorrhage. Contraindications to thrombolysis, including recent surgery, trauma, stroke, haemorrhage and cardiopulmonary resuscitation are commonly encountered; seen in almost 40% of patients in large series [5–7]. While the fierce thrombolysis-embolectomy debate continues, it is unlikely that randomised evidence comparing interventions for massive pulmonary embolism will ever be collected, given the near-impossible task of conducting trials in such high-stakes environments.

The role of surgery is better defined in situations where thrombolysis has failed or where pulmonary embolism is accompanied by right heart thrombus. Following thrombolysis, a significant time lag of up to 24 h may precede clot dispersion and haemodynamic improvement [8]. It is therefore arguable that we could have further delayed surgical embolectomy in our case, thereby allowing more time for thrombus dissolution. However, we were cautious not to delay potentially life-saving intervention in the face of a progressively deteriorating patient. It is also notable that arterial reperfusion is greater the earlier thrombolysis is given, and deterioration following a delay in thrombolysis should also favour surgical embolectomy [9,10].

The patient described in this case report not only failed to improve with thrombolysis, but also had accompanying right heart thrombus – a marker for poor prognosis in the setting of pulmonary embolism [11]. This cohort has more severe hemodynamic compromise, higher pulmonary pressures and worse right heart dysfunction on echocardiography [12]. It is not known whether the atrial thrombus itself contributes to haemodynamic compromise or rather acts as a marker for heavy thromboembolic burden in the pulmonary arteries. Even less convincing data have been published to guide the management of this complex group of high-risk patients [11–13]. Both thrombolysis and embolectomy have been used, but perhaps an even lower threshold for surgical intervention is reasonable given the reported successes and uniformly fatal nature of embolising a large right atrial thrombus [14,15].

4. Conclusion

Overall, our experience adds to the data suggesting that embolectomy offers favourable outcomes in selected cases of complicated pulmonary embolism. These patients are too heterogeneous a group to inscribe specific management directives such that early consultation with cardiothoracic services and discus-

sion among multiple disciplines is crucial to improving patient outcomes.

Conflicts of interest

None.

Ethical approval

None.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Simon De Freitas wrote the paper.

Caoilfhionn Connolly collected the data and reviewed the paper.

Guarantor

Simon De Freitas.

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